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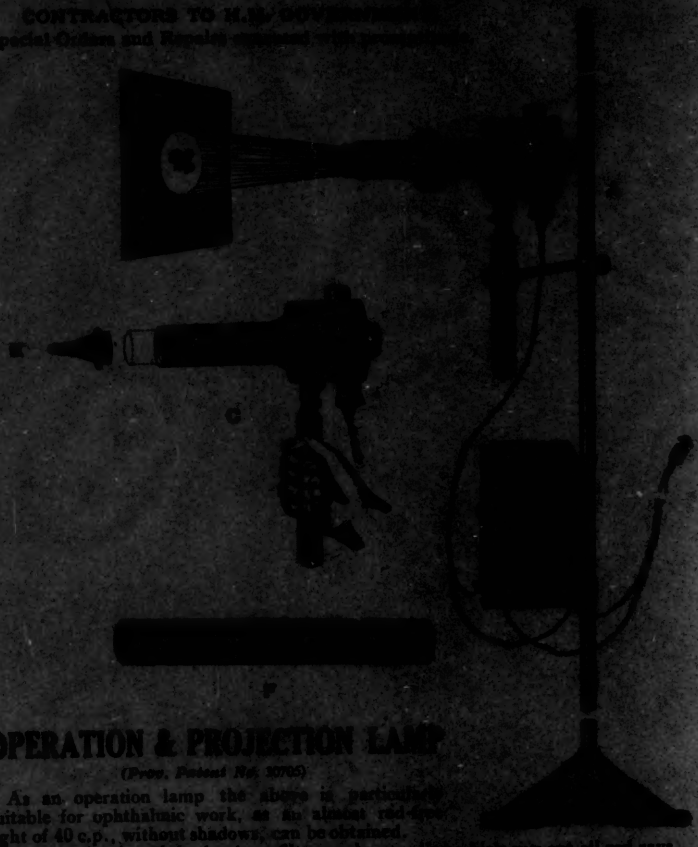

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COMMUNICATIONS

CONGENITAL MIOSIS OR PINHOLE PUPILS OWING TO DEVELOPMENTAL FAULTS OF THE DILATATOR MUSCLE*

BY

S. HOLTH AND O. BERNER,

CHRISTIANIA, NORWAY

Part I.—Clinical.—*By* S. HOLTH

THE pupil must be considered abnormally small when its diameter is less than 2 mm. by diffuse daylight, the eyes looking at a distant object. A pupil of 1.5 mm., or less, under the same conditions is in a pathological contraction, ***miosis*** (*μειόω*=I diminish); the spelling "myosis" is wrong (J. Hirschberg). This marked contraction of the pupil, most frequently appearing after a local application of eserin or pilocarpin, is a well known characteristic also of certain intoxications (especially of opium or morphia); it appears in several diseases of the brain or the spinal cord, and is seen--mostly unilaterally—in paralysis of the cervical sympathetic nerve.

These conditions are excluded in the three cases of congenital extremely contracted pupils observed by me, and which I will describe below.

Congenital miosis must be extremely rare; during thirty years I have only seen these three cases. As shown below in other cases

*Read at "Det medicinske Selskap i Kristiania," February 23, 1921, and February, 21, 1923.

the condition has been mistaken for spinal miosis or for the sequelae of iritis.

In the ophthalmological literature very little is to be found concerning congenital miosis and in the neurological literature nothing.

W. R. Wilde's essay of 1862 on "Malformations and Congenital Diseases of the Organ of Sight"[1] seems to be the work on which the references in English writings on the subject are based. Wilde clearly differentiates between congenital miosis or microcoria and "Sinizesis congenita" due to closure of the iridial aperture produced by persistence of the pupillary membrane. He saw "Myosis congenita" in both the eyes of one patient, unilateral miosis in two patients, one of whom had been considered elsewhere as suffering from "*syphilitic iritis*" and had been treated for this non-existing disease; a third unilateral case is called "Microcoria" but Wilde adds: "It was almost similar in appearance to the preceding cases." None of these patients could tell of any similar cases in their families. There was no microscopical examination. Neither does Wilde speak of the effect of mydriatics nor of treatment in these cases.

X. Galezowski[2] saw four cases of "myosis," without any disease of the optic nerve; there was nearly always at the same time a contraction of the accommodation muscle. Galezowski gave no information as to whether the cases were congenital; nor do Truc and Valude when they say[3] that the pupil may be a pin point, responding comparatively weakly to mydriatics.

In Collins and Mayou's work[10] the condition is twice mentioned, and the probability of a feeble development of the iris musculature is stated. In cases of congenital cataract the authors have often seen that the pupil will not dilate well on the application of atropin. I have made the same observation myself in such cases; but I have never seen the pupils so small here as in my three cases of miosis congenita.

In the *American Encyclopedia and Dictionary of Ophthalmology*[14] Dr. D. T. Vail gives thirteen lines about the matter. He says that the condition must be a fault of development, and states that it may appear in consanguineous marriage of the parents, but there are also cases without consanguinity. It may be combined with microcornea or other signs of microphthalmus; there is no treatment to be suggested.

Kurt Saupe[17] has observed a case of unilateral congenital miosis; the previously consulted oculist considered the pinhole pupil as Argyll Robertson's spinal miosis, and wrongly diagnosticated tabes. Saupe considers the miosis in his case as congenital, but does not know if the defect is in the dilatator muscle itself or in its innervation. The author had not the opportunity to make a microscopical examination.

Since the autumn of 1897 I have had under observation two sisters and a brother whose pupils have all their lives had a diameter of about 0.5 mm.; after several days of instillation of mydriatics the pupils were dilated to 2.5 mm. at the utmost, but generally less. Addition of cocain 5 per cent. did not further dilate the pupils, but the palpebral fissures were enlarged (some exopthalmus); this fact shows that the cervical sympathetic nerve functions well. The three patients never squinted, and had good horizontal and vertical muscle balance for the distance of 5 metres; for reading distance (30 cm.) only the few normal degrees of exophoria, no hyperphoria. Only one of them—case (*a*)—had spasm of accommodation.

(*a*) **Miss Ingeborg B.** (the youngest of them, born in 1876) came to consult me on September 4, 1897. On my inquiries she

FIG. 1.

The pupils of Ingeborg B. in her 21st year on September 5, 1897 (before application of mydriatics). This illustration as well as Fig. 2 and Fig. 3 are reproductions of pencil sketches by Asta Nörregaard, the artist; the sketches are on a somewhat reduced scale, the horizontal diameter of the corneae being in reality 11.5 mm. instead of 10 mm. as drawn. But the same artist painted the originals of Fig. 4 and of Fig. 5 in natural size.

informed me that as long as she could remember, her eyesight, like that of her elder sister Anna and of Axel the twin-brother of the latter, had been very bad in twilight. The parents had observed in all of them pinhole pupils since their birth. A younger brother, born in 1881, has normal pupils, and his eyesight is always good even in twilight. The parents were cousins; the father was stated not to see quite well, and his pupils were rather small (I estimated them to be between 1.5 and 2 mm. when, one day in 1897, he came in his 60th year for a prescription for his daughter; I proposed an examination of his eyes but he refused; some years later he died). Ingeborg complains of shortsightedness and of daily headaches, a feeling of pressure in and above her eyes with pains in the back of her head, all of which she has had as long as she can remember. Her pupils are extremely small, the right one 0·3 mm., and the left one 0·5 mm. in diameter (Fig. 1); they show a slight eccentricity upwards (Fig. 1 and Fig. 3).

The pupils do not react to light or to convergence. The colour of the iris is mainly diffuse chestnut brown, in some places however greenish grey; the radial fibres are close and stretched, and never undulating; circular folds do not exist. The pupils, after instillation of 1 per cent. atropin thrice a day for four days, were dilated to 2.5 mm. (Fig. 2); this diameter was kept for many years by instillation of scopolamin 0.2 per cent. every morning; even during this slight mydriasis, no circular contraction grooves were seen in the periphery of the iris.

In her 21st year the myopia was ascertained to be -2.75 in the right eye and -1.25 sph. $\bigcirc$ -1.5 cyl. .40° in the left eye with V = 5/4 in both, while before the atropinization sph.—10.0 to —12.0 D were required to obtain nearly the same vision (V = 5/5).

FIG. 2.

The pupils of Ingeborg B. in her 21st year on October 9, 1897, after instillation of atropin 1 per cent. thrice a day for four days.

After the atropinization the normal fundus could be seen both in erect and inverted image, which was impossible through the pinhole pupils. The visual fields were good for white and colours (Ole Bull's colours—"invariable" in the periphery), for colours however somewhat more narrow before the dilatation of the pupils than after the dilatation. The tension is normal and is minus after the lapse of 26 years—still so.

After the atropinization, the patient's headaches disappeared, but in the course of a few weeks the atropin caused conjunctivitis. I then prescribed scopolamin 0.2 per cent. for instillation every morning, which did no harm to the conjunctiva. She has continued this treatment without interruption for the last 26 years; if the instillation is omitted a single morning she has her old headaches later in the day, whilst at the same time the refraction increases, though not to the same degree now as in her youth. The static refraction under mydriasis is also lower now than in her youth; the degree of myopia has decreased. Thus I found the following

refraction on October 23, 1919, at 11 a.m., after the usual instillation of scopolamin at her home three hours previously:

Right eye: -1.75 sph. $\bigcirc -0.75$ $90° = 5/5$.

Left eye: -0.75 sph. $\bigcirc -0.75$ cyl. $60°$ 5/4.

On February 23, 1921, I showed the patient to my colleagues in the Medical Society in Christiania[15]; to show the difference in the pupils without the slight mydriasis, and with it, I told the patient to omit the instillation of scopolamin in the right eye for a whole week beforehand. The refraction of the right eye in the patient's forty-fifth year on February 23 was: -1.0 sph. $\bigcirc -0.75$ cyl. $90° = 5/6$. After resuming the scopolamin application the spherical correction, as in 1919, was -1.5 and $V = 5/5$. During the week, when the right eye was without scopolamin, the patient again had her former dull pains in and over the eye and at the back of her

FIG. 3.

The pupils of Ingeborg B in her 45th year on March 4, 1921, at 1 p.m, after the usual 0.2 per cent. scopolamin instillation in each eye at 8 a.m. on the same day and after the application of an atropin crystal to the left eye at 10 a.m.

head—but on the right side only. The scopolamin application, which in 1897, like the atropin, effected a diameter of the pupils of 2.5 mm. (Fig. 2), now caused a diameter of somewhat more than 1 mm. only (Fig. 3); the addition of an atropin crystal did not further dilate the pupil.

It is the spasm of accommodation and its consequence, the headaches, which have necessitated the scopolamin application daily all these years; it has moreover highly improved the eyesight in twilight: on account of the moderate myopia, reading and close work, in spite of the paralysis of the accommodation, have been easy for the patient. If she had been emmetropic or hypermetropic without spasm of accommodation, a small iridectomy upwards would have been the best thing—in order to spare the accommodation.

On January 12, 1923, examination of both eyes under slit lamp illumination with binocular microscope $\times 24$: no trace of pupillary membrane in the pupillary area, no synechiae.

(*b*) **Miss Anna B.**, Ingeborg's sister, born July 28, 1867, has been under my observation since December 1, 1897. She has never suffered from headaches or spasm of accommodation. Right pupil formed a vertical slit 0.25 × 0.5 mm., left pupil a nearly horizontal slit 0.5 × 1 mm. (Fig. 4).

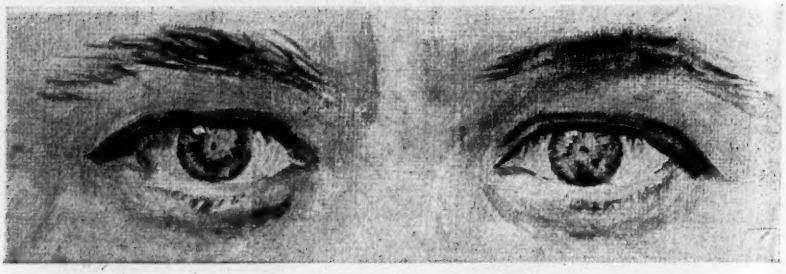

FIG. 4.

The pupils of Anna B. in her 30th year on December 2, 1897, before application of mydriatics and also in her 50th year in spite of continual daily application of mydriatics since 1897.

FIG. 5.

The pupils of Anna B. in her 30th year on December 9, 1897, after instillation of atropin 1 per cent. thrice a day for four days.

The iris in both eyes was blue slate colour, with a central sphincteral zone yellow as raw sienna earth (a similar iris colour was seen in one of W. R. Wilde's cases): closely stretched and not undulating radial fibres, no circular contraction grooves in the periphery. The right pupil after instillation of 1 per cent. atropin thrice a day for four days became nearly round with 2 mm. diameter, while the left pupil became a horizontal oval with diameter 1.5 × 2 mm.; as shown in Fig. 5, both pupils have a somewhat polygonal

outline, but by focal light and magnifying lens+40 D. no posterior synechiae are seen.

Under atropin the refraction was the same as before:—Right eye−7.0 V.=5/6. Left eye−8.0 V.=5/5. The eyesight in twilight was much improved. Owing to atropin catarrh I continued the mydriasis with 0.2 per cent. scopolamin every morning for 22 years. But when she approached the age of 50 the mydriatic effect decreased. When I saw her on October 6, 1919, in spite of scopolamin the pupils were exactly of the same form and size as before the beginning of the treatment (Fig. 4), nor did atropin effect any change. The myopia was much increased in both eyes, and vision diminished by retinal changes at macula lutea (visible after iridectomy): Right eye−15.0 V.=5/30. Left eye−16.0 V.=5/15. Both eyes: tension normal and visual fields of good extent for white objects in full daylight; but in twilight very contracted. I made an iridectomy upwards first on the right eye, then on the left; the small pieces of the iris removed by iridectomy were sent to Dr. Berner for microscopical examination. I stretched the pieces out on paraffined cork plates, but they curled so much in the fixation liquids that orientation in the sections became impossible. As a result of the division of the sphincter by the iridectomy the horizontal diameter of the pupils became again 2 mm. just as after mydriatics in the patient's youth; she could now again see much better in twilight.

On March 31, 1920, the patient died suddenly of apoplexia cerebri. A post-mortem examination of the eyes was allowed on April 3—61 hours after death. Before the enucleation I injected 1 c.cm. of Bouin's fluid (saturated solution of picric acid in water 75 c.cm., formol 25 c.cm., concentrated acetic acid 5 c.cm.) in the vitreous of both collapsed globes till the tension was felt normal, and preserved the enucleated globes in the same fluid; rabbit eyes were used as protheses. Both globes oval (with staphyloma posticum verum, axis antero-posterior in R.E. 28 mm., in L.E. 28.5 mm.) were sent to Prosector O. Berner, M.D., who could now orientate all the microscopical sections of the iris of these eyes.

(c) **Mr. Axel B.**, the twin brother of Anna (Case *b*), I have seen once only, on October 29, 1919, when he was more than fifty-two years old; his sister Ingeborg (Case *a*) had asked him to come. Like Anna he never suffered from headaches or spasm of accommodation. He said that in his youth, when he was driving on the high road by twilight, he had difficulties in steering the horse and they both often ended in the ditch. Now that he lives in town he is mostly indoors, and does not like to go out except in full daylight. He is emmetropic in both eyes with V. = 5/5 and reads without glasses Jäger No. 1 at 25 cm. (pinhole pupils: minimal circles of diffusion). The iris in both eyes is an even cinnamon brown, with

the radial fibres closely stretched and not undulating; no circular grooves in the periphery. The right pupil is nearly round, 0.75 mm. in diameter; the left pupil forms a horizontal oval 0.5 × 0.75 mm. in diameter. After two instillations of homatropin 1 per cent. in the course of three hours the right pupil was dilated to 2 × 2.5 mm. and the left pupil to 1.75 × 2 mm.; he is still emmetropic with V. = 5/5, but to be able to read Jäger No. 1 at a distance of 30 cm. he must now use + 3.0D; he cannot read without convex glasses on account of larger circles of diffusion. The patient, though admitting the advantage of being able to see well also in twilight, preferred to be without mydriatics in order to do his office work and his reading without spectacles as hitherto.

On March 6, 1922, Axel B. died of apoplexia cerebri after a few days' illness. Post-mortem enucleation of the eyes was allowed and made six hours after death; protheses, rabbit eyes. The enucleated globes were preserved in Bouin's fluid and immediately sent to Dr. O. Berner.

Part II.—Anatomical.—*By* O. BERNER
(Abridged account by S. HOLTH)

The transverse diameter of the pupils in the enucleated eyes of Anna B. (case *b*) is 2 mm., as after iridectomy in vivo; in those of Axel B. (case *c*) 2.5 mm., as after homatropin and cocain in vivo (less a 10 per cent. deduction because of the corneal magnification; the normal post-mortem diameter of the pupil of man at the age of 50 years is 5 mm.

In a sector of each iris some sections—meridional and transversal—were made before depigmentation. As depigmentation of the sections is a method in which much time is wasted, Alfieri's method was tried in the iris in toto from normal persons of all ages, and with excellent result; then the iris and the ciliary body from the four globes with miosis congenita were also depigmented in toto by Alfieri's method. Normal irides (for comparison) were also depigmented in toto by a concentrated solution of hydrogen dioxide (from E. Merck) to which was added a few drops of ammoniacal water. By both methods the bleaching was made in a short time under an ordinary electric incandescent lamp. Imbedding in paraffin, serial sections of 5μ, staining with different methods: van Gieson's liquid, Böhmer's haematoxylin and eosin, Heidenhain's iron-alum-haematoxylin and counter-staining with eosin. This Heidenhain's staining is superior in clearness, and has the great advantage of making the sections preservable for any length of time.

Case B (Anna B.).—*The microscopical examination of the sections* revealed no difference between the two eyes; they will therefore be

described together. The iris (Fig. 6) is somewhat thin, with the exception of the central part, where the sphincter muscle is very distinct.

On examining *non-depigmented sections* it was at once noticed that the membrane of Bruch, or, as it is often called, the inner limiting membrane, to a great extent was defective. In a few sections and especially with regard to the intermediary and peripheral part of the iris, in front of the pigmented layer there was only a faint red rim where the membrane of Bruch should have been; but it extended only a little way in (Fig 6.)

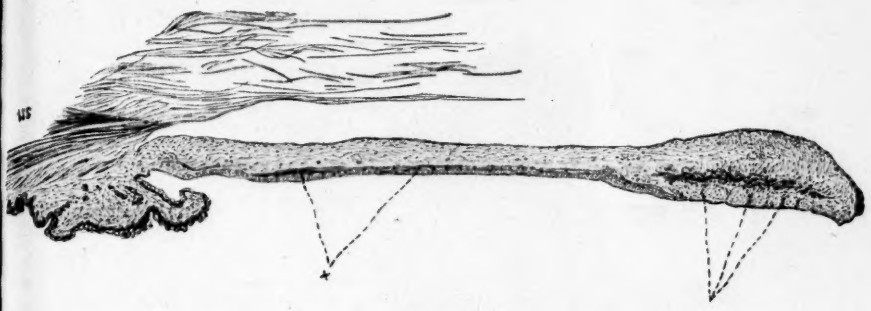

FIG. 6. Sh. f.

A general view of a radial section through the iris of Anna B. (Case B). It will be seen that the pupillary part is thick and contains the well developed sphincter. The intermediary and peripheral parts of the iris, on the other hand, are very thin; *sh. f.* indicate the short connecting fibres between the sphincter and the dilatator, and it will be seen how the sphincter draws the dilatator to itself, so that corresponding little depressions are formed upon the posterior surface of the iris.—× indicates places where small quantities of dilatator have developed.

This absence of the membrane of Bruch is indeed so marked as regards the middle and peripheral parts of the iris, that it may be said to be the rule. The most that is seen is a faint reddish colour at the anterior margin of the pigment layer between this and the stroma. But in the central part of the iris, i.e., behind the sphincter, a distinct red rim, answering to the membrane of Bruch in normal sections, is constantly seen.

The absence or defective development of the membrane of Bruch between the ciliary body and the periphery of the sphincter is still more marked in the *depigmented sections*, where the epithelium continues right up to the stroma; the boundary between the separate cells in the front layer, the "muscle epithelium layer," appears as a rule, but not always, clear and distinct, although the greater part of it has not developed into contractile elements. These cells may be

fusiform (Fig. 8), or in any case somewhat pointed at the ends (Fig. 7). The majority of these cells are certainly long enough to cover 4 or 5 cells in the hinder layer; the cells in this layer are

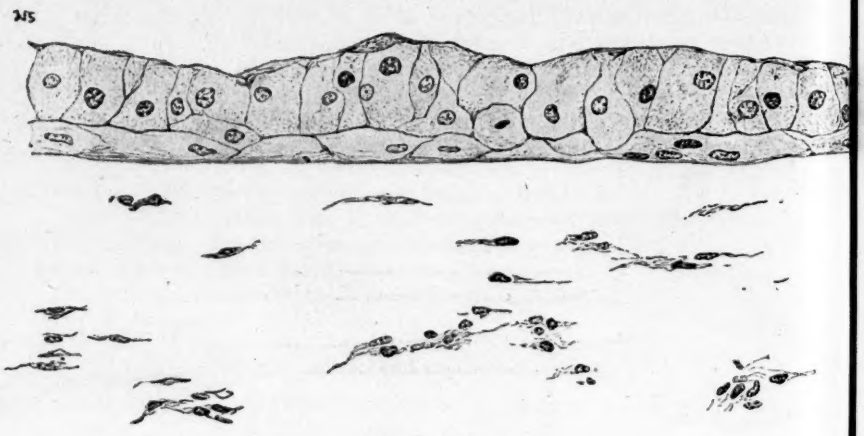

FIG. 7.

The appearance of the pigment epithelium from the intermediary part of the iris of Anna B. (Case B) after depigmentation; in front a flat epithelium with well marked cells. (× about 800).

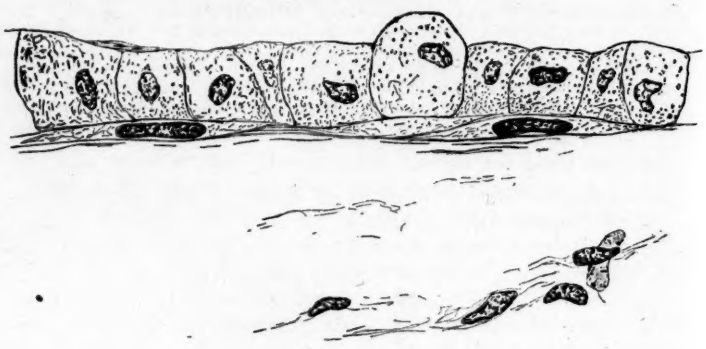

FIG. 8.

A view of the depigmented epithelium from an intermediary part of the iris of Anna B (Case B): there are well marked spindle-shaped cells in the front layer. (× about 800).

cubical, while those in the front layer—the muscle epithelium layer—are long or at any rate oval.—These long flat cells not infrequently contain 2, and sometimes 3, nuclei, which are occasionally rounded, but generally elongated.

In those places where the dilatator has developed, several types of it may be found. Behind the sphincter for instance, the normal conditions are seen. In those patches in which the dilatator is more or less poorly developed there are in front of the undifferentiated front layer of epithelium spindle-shaped epithelial cells which in form resemble plain muscle cells but in which no myoglia fibres are developed.

In most cases however, there are myoglia fibres in these spindle-shaped cells, and there is therefore no reason to doubt that these are cells of plain muscle lying in front of the anterior epithelial layer.

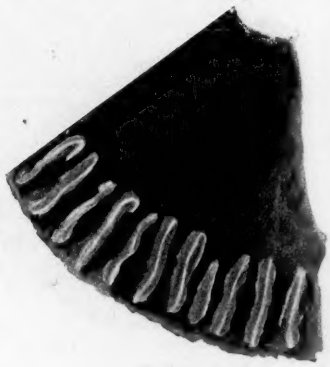

FIG. 9.

A drawing of the posterior surface of the iris of Anna B. (Case B), made under a binocular microscope and bright light. (× about 12).

In transverse sections are here sometimes seen—but few and far between—plain muscle bundles projecting into the stroma.

It is also due to the poor development of the dilatator that the back of the iris, under the microscope—preferably binocular—and a bright light, only very few of the radial folds are visible (Fig. 9).

In man, the dark brown, almost black, back surface of the normal iris appears smooth to the naked eye, and it is only under the microscope—preferably binocular—and a very strong light that the two groups of radial folds appear in distinct relief. As no illustration of this condition is given in ophthalmological, and only very rarely in anatomical, textbooks, we have thought it desirable to give an illustration of the posterior surface of a normal iris, from a girl of 17 years, as seen under the binocular microscope (Fig. 10), in order to show how entirely different are the conditions in the case of miosis congenita of Anna B. (Fig. 9).

Fig. 10 shows the two systems of radial folds well developed, both Schwalbe's contraction folds behind the sphincter and the structural folds which begin 1.5 mm. from the margin of the pupil, and become broader and flatter towards the ciliary margin. Here, too, there are some fine circular folds which are only formed when the pupil is dilated. In miosis congenita the circular folds are therefore entirely absent. There are only indications of a few shallow structural radial folds on the posterior surface of the iris of Anna B. (Fig. 9). Notwithstanding the strong binocular magnification the surface here appears almost smooth.

With regard to the appearance of the stroma it was stated that in the pupillary part it was best developed, while in the intermediary

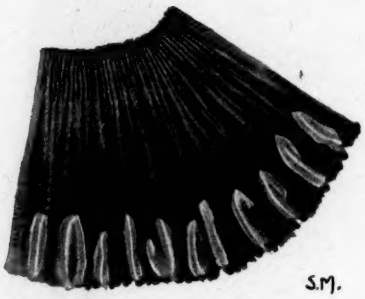

FIG. 10.

A drawing of tbe posterior surface of a normal iris, from a girl of 17, made under bright light and binocular microscope (× about 12). The structural radial folds have the same character in the normal iris of a man of 65.

part of the iris it presented a peculiar appearance, resembling the foetal mucoid (or gelatinous) tissue. In front of the sphincter the connective tissue contained an abundance of fixed cells, but there were no signs of inflammatory conditions in it; several cells were here pigmented, some of them "clump cells"—in vivo this region was sienna yellow. Behind the sphincter the tissue had a more sclerotic character with fewer cells and more numerous fibrils. In the mucoid stroma of the middle and peripheral part of the iris a peculiar ground substance was seen and in this scarce fibrils and cells of which very few were pigmented; in vivo this region had a blue slate colour. There was nothing remarkable about the stroma cells as regards their shape; in the Heidenhain coloured sections there were a good many large eosin stained cells with numerous dark granules in the protoplasm. The blood-vessels, too, presented no peculiarities.

We have thus shown that in Anna B.'s eyes the dilatator pupillae is defective in its development, and we must assume that the anomaly is due to an inhibition that has asserted itself in embryonal life. This inhibition has not affected that part of the dilatator that lies behind the sphincter, for this part is developed normally. We have, then, all the developmental stages from this normal condition

FIG. 11.

A general view of a radial section through the iris of Axel B (Case C). Short and long connecting muscular fibres are seen to go from the sphincter to the dilatator, which is well developed not only behind the sphincter but in most places, also in the intermediary part of the iris, where it ends in a thickening with muscular fibres unravelled and projected into the stroma (compare Fig. 14). In the thin periphery (compare Fig. 12 and Fig. 13) no Bruch's membrane or muscle cells are seen.

behind the sphincter down to the complete inhibition represented by pure epithelial cells in the intermediary and peripheral parts of the iris.

Case C (Axel B.).—Here also the microscopical examination of the sections revealed no difference between the two irides. But the dilatator muscle is better developed here than in the irides of the

FIG. 12.

Microphotograph (about × 13) of a radial section through the iris of Axel B. The thin dilatator-free part of the iris is here 1/5th of the distance between the pupillary and the ciliary border.

twin-sister Anna (Case *b*) ; as twins of different sex they originate from different ova.

In Axel B.'s irides the dilatator is well developed not only behind the sphincter, but also in the intermediary zone. The dilatator muscle fails only in the periphery ; this dilatator-free zone may in many places be measured to be 1/10 or 1/8 of the distance between the pupillary and the ciliary border (Fig. 11) ; in other places to be 1/5 (Fig. 12, enlarged in Fig. 13).

Between the intermediary and the peripheral zone the iris forms a thickening in which the dilatator ends (Figs. 11, 12, 13 and 14).

In the peri-pupillary region the dilatator receives short muscular connecting fibres from the sphincter, and in the intermediary part long ones (Fig. 11). In the intermediary region Bruch's

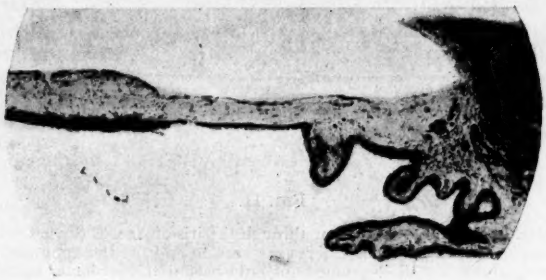

FIG. 13.

Enlarged microphotograph (about × 45) of the thickening and thin dilatator-free iris periphery in Fig. 12.

FIG. 14.

Microphotograph (× about 150) from a radial section of the iris of Axel B. through the thickening in the intermediary part where the dilatator ends unravelled in muscular fibres, which are projected into the stroma diverging in all directions.

membrane is clearly seen also without depigmentation, but in depigmented sections usually small spots are seen in which the dilatator is completely lacking—a finding known also in the normal iris (von Szily). The front layer of the epithelium is here in immediate contact with the stroma, which—as in the thin dilatator-free periphery—has an extraordinary lax structure like foetal mucoid

tissue. But in most places the stroma is normal and contains pigmented cells of which several are "clump cells"; in vivo the whole iris had a cinnamon brown colour. In the stroma in front of the sphincter there are perhaps more fixed cells and behind the sphincter perhaps more fibrils than in a normal iris, but nowhere

FIG. 15.

A drawing of the posterior surface of the iris of Axel B. made under bright light and binocular microscope (× about 13). Radial structural folds are seen, but in less pronounced relief than in a normal iris (Fig. 10). During the fixation in Bouin's fluid the lens capsule became partly adherent to the pigment epithelium, which during the preparation followed the removed capsule in some places (the light spots in the drawing).
(To colleagues desiring more details of the microscopical anatomy of the iris in congenital miosis, on application to the authors, reprints of Lit. 16 (and later of Lit. 18), which contains more text, more microphotographs, and several drawings reproduced in four colour print, may be sent.—Figs. 4, 5, 9, 10, and 15 in this article are printed with blocks chosen among those made for four colour print in Lit. 16 and 18).

signs of or sequelae of inflammation. In the above-named thickening the stroma is richer in fibres and is more red stained with eosin than elsewhere in the intermediary zone; the dilatator is unravelled here in fine muscular fibres which are projected into the stroma diverging in all directions (Fig. 14).

The epithelial layers have also an increased volume (Fig. 14) on the posterior surface of this thickening which is found in most of the section series; but in some series the thickening is completely

lacking and here the dilatator-free part advances much more towards the pupil than elsewhere.

When one sees the sections of the thin dilatator-free iris periphery, one receives the impression that this peripheral part has been strongly stretched by the continuous contraction of the sphincter. One might be tempted to believe that the above-named thickening may be the dilatator's normal site of origin, which has been loosened from the ciliary region. In opposition to this surmise is the fact that the muscle fibres are unravelled from the dilatator end and projected in all directions into the stroma here. Some epithelial processes into this stroma point towards the periphery. Also in the iris of the twin sister Anna (Case *b*), a few similar thickenings in the intermediary part are seen. With both twins a congenital inhibition of the dilatator development must be presumed.

According to the better development of the dilatator the posterior surface of the iris of Axel B. is less smooth than that of his twin sister Anna (Fig. 9), the posterior surface of his iris shows radial structural folds (Fig. 15), although in less strong relief than in a normal iris (Fig. 10).

Part III.—Epicrisis.—*By* S. HOLTH

From my clinical observations I drew the conclusion that these congenital pinhole pupils could not be explained by a primary spasm of the sphincter muscle which nearly always—as after an instillation of miotics—is accompanied by spasm of the ciliary muscle. But spasm of accommodation was only found in one of the three patients, the still living Ingeborg B. (Case *a*), whose static myopia is of a low degeee; the permanent spasm of accommodation is observed to cause a considerable increase of her myopia even in her forty-fifth year. This spasm of accommodation is accompanied by frontal and occipital headaches, which always disappear after a local application of mydriatics to the eyes. The patient has till now never suffered from any disease of the central nervous system; I believe therefore that this spasm of the ciliary muscle must be considered to be due to a kind of irradiation from the m. sphincter pupillae, which having no antagonist is always contracted. But the reason why only Miss Ingeborg suffers from spasm of accommodation and never her emmetropic brother Axel or her strongly myopic sister Anna, I confess I cannot explain.

Another explanation of miosis is paralysis of the cervical sympathetic nerve: but my patients had no sign of this; e.g., no ptosis; furthermore the application of cocain produced a slight exophthalmus with enlargement of the palpebral fissures. The sympathetic miosis, however, is nearly always unilateral and never shows the pupil so narrow as a pinhole. For these reasons I believed the most natural explanation of the lack of dilatator

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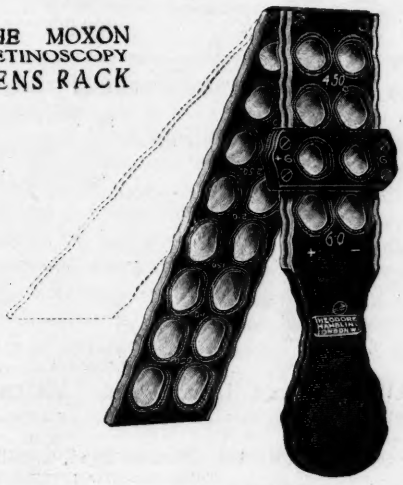

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muscle from birth, to be that the *dilatator muscle itself* was *not developed or very incompletely so.* I think that Prosector O. Berner's fine preparations give decisive evidence of the truth of this surmise.

I will, however, draw attention to some more peculiarities in the iris of the four anatomically examined eyes with congenital miosis. In the dilatator-free parts of the iris the stroma has the character of foetal mucoid or gelatinous tissue. This is also the case with the thin peripheral dilatator-free part of the iris of Axel B. (Fig. 13), although the dilatator is well developed in the intermediary part, the muscle being destitute of peripheral anchorage—in other words, having no functional origin—cannot act as the sphincter's antagonist. In the normal iris the stroma is much denser in the peripheral than in the intermediary zone.

In congenital miosis the stroma in the sphincter region, too, may perhaps be said to have a peculiar character: in front of the sphincter perhaps some more fixed cells than in the normal iris at different ages, and behind the sphincter perhaps some more fibres. The deviations of the pupils from the round form in cases (*b*) and (*c*)—compare Figs. 4 and 5—may perhaps be explained by meridional variations of the elasticity of the peripupillary stroma. These conditions are, however, difficult to interpret, because also in the normal iris the peripupillary as well as the peripheral stroma is denser than the intermediary stroma. At any rate the qualities of the stroma must be much less important for the explanation of the congenital miosis than the discovered considerable deficiencies in the dilatator muscle.

Finally I wish to say that the use or the elimination of the accommodation does not seem to have influenced the static refraction of the six clinically examined eyes.

In Case (*a*) Ingeborg B., in spite of continuous spasm of accommodation since her early childhood, the static myopia was very moderate at the age of 21, viz.—2.75 and—1.25 D. The diminution of the myopia at the age of 43, to—1.5 and—0.75 D, was, in my opinion, not caused by the mydriatic elimination of the accommodation during 22 years; I believe that the refraction of the lens itself is slightly decreased with age. During these 22 years she has never used convex glasses for close work because she can easily read without glasses Snellen 0.5 at distances between 20 and 50 centimeters (narrow pupils: small circles of diffusion). From the age of 21 she has had daily instillations of mydriatics; before that time she had been obliged to converge strongly during reading and close work because her myopia, by spasm of accommodation, was increased to —10 or —12 D.

In Case (*b*) Anna B. I would repeat that the patient never suffered from spasm of accommodation, and her myopia at the age of thirty

years was —7 and —8 D, and was increased at the age of fifty-two, to —15 and —16 D in spite of daily mydriatic elimination of the accommodation during 22 years. She could never be persuaded to use strong or weak concave glasses, and did much reading and fine close work under strong convergence and with bent head.

Anna's emmetropic twin brother Axel B. (Case *c*) was until his thirtieth year a country gentleman and did not do much reading or close work during his youth; he never suffered from spasm of accommodation.

Treatment of Congenital Miosis

Presbyopes with exclusively indoor life may prefer no treatment at all [e.g. Case (*c*) Axel B.] : they can read for a long time without glasses. But in outdoor life the twilight blindness is very embarrassing and can be relieved in two ways.

1. By daily application of mydriatics to the eyes, when myopic, as long as the pupils by this means can be dilated to 1.5 or 2 mm. diameter; this treatment is also indicated in other refractions when the miosis is complicated by spasm of accommodation. It appears, however, that a local habitude to or resistance against mydriatics develops after a lapse of many years, so that their dilating power on the pupil gradually decreases [Cases (*a*) and (*b*)]. It is scarcely age which affects this, for in Case (*c*) Axel B. at the age of 52, a few instillations of 1 per cent. homatropin dilated the pupils to 2 and 2.5 mm. as other mydriatics did with his sisters at the age of from twenty-one to thirty years.

2. By optical *iridectomy*—as a rule upwards and not broad (vertical application of the blades of the iris scissors); indicated in all refraction conditions where the accommodation should be left intact, but also if mydriatics appear to be injurious, e.g. by increasing the tension (which I have not seen in my cases). Iridectomy may also prove necessary in elderly—mainly myopic—persons, when the dilating effects of mydriatics after daily applications during many years are at last insufficient or nil (Case *c*).

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BINOCULAR CHOROIDAL TUBERCULOSIS WITH DETACHMENT OF THE RETINA IN TWO KITTENS.* ADDENDUM

BY

J. B. LAWFORD AND HUMPHREY NEAME

LONDON

DR. STANLEY GRIFFITHS reports on his bacteriological investigation of specimens from the second kitten as follows:—

"An emulsion of the mesenteric gland produced general tuberculosis in a rabbit, and cultures obtained from the lesions of the cat were typically bovine in cultural characteristics.

"Undoubtedly the infecting tubercle bacilli are bovine in type."

* See BRITISH JOURNAL OF OPHTHALMOLOGY, July, 1923, p. 305.

TOURNAY'S REACTION

BY

P. G. DOYNE

LONDON

THE data for this paper were obtained by examining the eyes of 40 cases of general paralysis of the insane for the presence or absence of Tournay's reaction. These cases were seen at the Springfield Mental Hospital and I must express my indebtedness to Dr. Worth, the superintendent of that hospital, for affording me every opportunity for so doing. In addition to these cases of general paralysis of the insane, in the course of routine examination of all patients at that hospital I looked for this reaction. Tournay describes the reaction as follows:—"When a man whose ocular apparatus is normal, whose pupils are equal, reacting normally to light, contracting normally and equally with movements of convergence and accommodation, looks strongly to his right and maintains this position the right pupil becomes larger than the left. Thus isocoria being the rule in anterior fixation, anisocoria becomes the rule in lateral fixation." Chenet and Noyer* in a study of this reaction arrive at the following conclusions:—1. In healthy subjects dilatation of the abducted eye is the rule. With regard to the contraction of the pupil of the adducted eye, it was extremely doubtful if this ever occurred. 2. The reaction was present in the cat and the dog, but not in rabbits or horses. 3. Mydriatics suppress and miotics abolish the reaction. 4. In pathological cases; (*a*) the iris being mobile, the reaction was present in all ocular affections, even in those (optic atrophy) which destroy sight. (*b*) In cases of paralysis of the sympathetic the reaction persists. (*c*) In 15 cases of lesions of the central nervous system (tabes, general paralysis of the insane, and anterior poliomyelitis) the reaction was absent. My own experience closely confirms the above. Certainly I never with certainty observed contraction of the pupil of the adducted eye. I attend this hospital in the evenings between five and seven. When I first started testing for this reaction it was winter time, and, naturally, I stood the patient in front of the light in order to observe the pupils clearly. At that time I obtained dilatation of the pupil of the abducted eye readily; but later on, during the summer, when the room became more evenly illuminated by natural light, I found it more and more difficult to obtain the reaction. It would appear that in the normal eye, at any rate, the amount and nature of the surrounding illumination is a factor in the

* For abstract see *British Journal of Ophthalmology*, Vol. V, (1921), p. 520.

production of the reaction. Nevertheless, the conclusion which I arrived at is that in extreme abduction the pupil of the abducted eye dilates, but that the ease with which this dilatation can be obtained varies within wide limits from case to case. W. Bevan Lewis, in a paper on "Ocular symptoms occurring in general paralysis of the insane" (*Trans. Ophth. Soc.*, Vol. III., p. 204), concludes from the observation of 60 cases of general paralysis of the insane that the loss of reflex dilatation of the pupil on sensory stimulation is the earliest and most constant ocular sign in this condition. I had this observation in mind when examining my series of cases. When having my own eyes tested for Tournay's reaction, I experienced a feeling of strain and discomfort when the eyes were strongly lateralized, and this discomfort was confined to the abducted eye. This is not, of course, akin to cutaneous stimulation; but as, in the majority of cases, it is only on extreme abduction that the reaction can be obtained, and as this extreme abduction causes discomfort, I thought that this might have something to do with the production of the reaction.

With regard to my series of 40 cases of general paralysis of the insane, the reaction was present in 15, absent in 18, doubtful in 4, and unilateral in 3 cases. Of these 40 cases, 20 had Argyll Robertson pupils, and of these 20 the reaction was absent in 14 cases, present in 4 cases, and doubtful in 1 case. In 5 cases out of 40 the pupils did not react to light or accommodation; in these 5 cases the reaction was absent in 4 and present in 1 case. Of the 3 unilateral cases, in 2 cases the right pupil was inactive to light, while the left pupil reacted sluggishly; the right pupil was also larger than the left. In these cases the reaction was only obtained in the left eye. The other case was similar, with the exception that it was the right eye which had the smaller and active pupil and which showed the reaction.

NOTE ON WERNICKE'S PUPILLARY REACTION

BY

J. D. CUMMINS

DUBLIN

THE restricted usefulness of this reaction, from a clinical point of view, will, I think, be admitted. The theory of the reaction is proof against criticism. But the manner of performing the test is important.

If the region, from which the afferent impulse of the reflex arises, be confined to a relatively small area around the fovea, as Hess

contends, the performance of the test requires a specially devised apparatus.

In the clinical round, one usually obtains a contraction of the pupil, by illuminating either half of the fundus with a light held at the side. This procedure is faulty.

More satisfactory is the plan of placing the patient, sideways, at a window, and, while directing him to look into the distance, of using diffuse daylight for illumination. Then, by turning right about, the other half of the fundus can be stimulated under like conditions. The eye, which is not being tested, ought to be covered with a dressing and light bandage.

For the test to be valid in the last procedure, the refraction of the eye must be emmetropic. Otherwise, the source of light and the illumined point on the retina will not be conjugate foci, and a diffuse lighting up, by reflection, of the interior of the globe will vitiate the result.

ANNOTATIONS

The value of letters and characters as visual tests.

That the letters used for sight testing vary in difficulty is a fact that has become almost universally recognized. Whereas letters like L and J which, approximate to isolated contours, are relatively easy, those which do not, such as S, R and B, are relatively difficult (cf. Hartridge and Owen, *Brit. Jl. of Ophthal.*, Dec., 1922).

Dr. Ewing, before the International Congress at Washington (D.C.), quotes the visual values for both block and Gothic letters, as compared with the Landolt broken ring. These values were obtained by the ophthalmic section of the American Medical Association. The recommendations made by the latter are:—

(1) That block letters are superior to Gothic.

(2) That the following block letters of medium difficulty should be used:—T, V, U, C, O, Y, F, P, D, *Z*. N, E. R, S, C. H.

(3) That Snellen's original standard of 1 minute of arc for the width of the black lines composing a letter, and 5 minutes for the height and width be adhered to.

It is a matter for considerable regret that no information is given by Dr. Ewing as to the methods used in carrying out the tests. Were the tests done in ordinary day-light, i.e., under illumination of very variable intensity or was a carefully standardized light source of constant intensity employed? Were the patients referred to in the paper skilled at making visual comparisons, or were they hospital patients taken at random? Were the tests done with an

ordinary variable pupil or was an artificial pupil used? Further, were the tests done so frequently that the figures quoted in the paper have some real numerical value? These are all questions about which nothing is said in the paper. Neither is any reason given for the fact that comparison was made with Landolt's broken ring. What are wanted are the minimum angles which the letters should subtend at the eye in order that they should be read correctly by a skilled observer with perfect vision under standard conditions of illumination, pupil, etc.

Taking, however, the figures given at their face value there are three other criticisms to be offered:—

(1) That C appears twice in the list of block letters, having a visual value of 0·79 in one place and one of 0·92 in another.

(2) That letters varying greatly in difficulty are included in the selected list. Thus among the 16 letters recommended, are T the visual value of which is given as 0·74, and H with one of 0·92, i.e., a variation of about 20 per cent. This variation would appear to be too large; it would be preferable to limit the number to the 9 letters:—V, U, Y, F, P, D, *Z*, N, E, which from the values given in the paper vary by under 10 per cent.

(3) The recommendation that letters be used which conform to Snellen's standard perpetuates the old square letter. This shape is stated to be distinctly inferior to that of Green's type in which the shape of the letter is given by:—height 5 minutes and width 4 minutes. This is also apparently the opinion of the committee appointed by the Council of British Ophthalmologists to consider test types.

It may, therefore, be said, that while there is no doubt that the letters of the alphabet vary in difficulty and that for purposes of sight testing a number should be selected which are approximately equally difficult, it is somewhat doubtful, owing to the scanty evidence given by Dr. Ewing, if the recommendations of the American Medical Association really meet the case.

Glasgow Eye Infirmary

In 1924 the Glasgow Eye Infirmary will have completed one hundred years of existence as an institution. In view of this interesting centenary Dr. Leslie Buchanan recently contributed to the *Glasgow Herald* a short article dealing specially with the beginnings of the infirmary under William Mackenzie and George Monteath, but carrying the history of the institution up to the time of Thomas Reid, who became surgeon in 1868. This article has been reprinted in the *Glasgow Medical Journal* for March, 1923, where it may be more accessible for professional readers than in the

Glasgow Herald. Further, the reprint contains very fine reproductions of portraits of Mackenzie, Monteath and Harry Rainy, which did not appear in the lay paper. This little history of the Glasgow Eye Infirmary is of the utmost interest, dealing as it does with the days when modern ophthalmology was in its infancy. Not the least interesting part of it deals with the extraordinarily wide reputation of Mackenzie, of which several examples are given. In one case, about twenty-four years after Mackenzie's death, an old man walked from Warrington to Glasgow, not, it is true, to see Mackenzie but his successor Reid. "He expressed himself as entirely satisfied at having had advice and seen Dr. Reid, who had followed the great Mackenzie, and proposed starting back for Warrington at once, with a bottle of Mackenzie's lotion and a pot of ointment in his pocket, in perfect faith that he was now at last on the safe road to recovery. A word to Dr. Reid resulted in his being 'kept in' for a week or two, and his gratitude was wonderful." In another case "an old shepherd came to the infirmary in the most casual manner and presented the writer (Dr. Buchanan was then assistant to Reid) with a note from a doctor in Port Stanley, Falkland Islands. Surely Mackenzie's name has gone round the world more than once and is still good. Patients come from the uttermost ends of the earth to the infirmary, which was so largely made by his good name." Those who are interested in the beginnings of things should surely read this article.

THE ADJOURNMENT OF THE INTERNATIONAL CONGRESS OF OPHTHALMOLOGY (1925)

WE have received the following communication which we publish by the request of the General Secretary of the French Society of Ophthalmology:

Les Comités de la Société d'Ophtalmologie de Paris, de la Société Belge d'Ophtalmologie et de la Société Française d'Ophtalmologie, estiment nécessaire de déclarer à nouveau que ces Sociétés ont accepté, sans réserve, l'emploi de la langue allemande, langue scientifique ou familière de plusieurs peuples, comme langue officielle du Congrès de Londres;

Qu'elles sont résolues à collaborer avec les Nationaux d'Autriche-Hongrie, de Bulgarie et de Turquie;

Qu'elles se refuseraient à participer à ce Congrès si les Allemands y étaient invités.

Ces Sociétés ont résumé les motifs de leurs décisions dans les ordres de jour suivants :

(1°) *Société d'Ophtalmologie de Paris*—Séance du 27 février 1923 :

" La Société d'Ophtalmologie de Paris, après avoir pris connaissance de la note publiée par le Comité du Congrès d'Ophtalmologie de Londres de 1925, décide :

Que ses membres seraient dans l'obligation de s'abstenir d'assister à ce Congrès si les Allemands y étaient invités, se conformant ainsi à la décision prise à Londres en octobre 1918, sur l'initiative de la Royal Society, et ratifiée à Bruxelles en 1919 ; décision non abrogée et motivée par des raisons auxquelles l'attitude de l'Allemagne et du Corps médical allemand a laissé jusqu'ici toute leur valeur."

(2°) *La Société Belge d'Ophtalmologie*—Séance du 29 avril, 1923, a pris la même décision.

(3°) Enfin, la *Société Française d'Ophtalmologie*, réunie le 11 juin, 1923 à Strasbourg, a, à l'unanimité des votants, approuvé la réponse suivante :

" La Société Française d'Ophtalmologie, après avoir pris connaissance de la Communication du Comité Organisateur du Congrés de Londres pour 1925 et avoir entendu ses délégués,

" Adresse aux Ophtalmologistes de Grande-Bretagne et d'Irlande ses cordiales et amicales sympathies,

" Déclare qu'elle accepte très volontiers de collaborer au Congrès International de Londres avec les Nationaux des Etats anciennement ennemis : Autriche, Bulgarie, Hongrie et Turquie,

" Mais que, dans les circonstances actuelles et malgré ses regrets, elle ne pourrait pas participer à ce Congrès si les Allemands y étaient invités.

" Elle reste ainsi en accord avec les Résolutions adoptées par la Conférence de Londres en octobre 1918 sur l'initiative de la Royal Society, résolutions confirmées de nouveau à Bruxelles en juillet 1922 par le Conseil International de Recherches, et dont les motifs d'exclusion s'appliquent toujours intégralement à l'attitude gardée par l'Allemagne et par le Corps médical allemand. En refusant récemment toute aide médicale aux Français et aux Belges par une décision collective, sans exemple dans l'histoire, l'Association des Médecins allemands en est même venue à fouler un des principes fondamentaux les plus nobles de notre morale professionelle."

COUNCIL OF BRITISH OPHTHALMOLOGISTS

THE TEACHING OF OPHTHALMOLOGY

The following correspondence on the teaching of ophthalmology to medical students has taken place between the Council of British Ophthalmologists and the General Medical Council. It has been sent to us for publication.

28*th March*, 1923.

To the Secretary,

GENERAL MEDICAL COUNCIL.

DEAR SIR—The Council of British Ophthalmologists begs to draw the attention of the General Medical Council to the following statement in the final Report of the Departmental Committee on the "Causes and Prevention of Blindness," which has recently been published:

> "We recognise that the inadequate knowledge of diseases of the eye possessed by the large majority of the medical profession on admission to the Register is in a large measure due to the very limited amount of training in this subject which they receive as medical students. With a few exceptions the universities and examining bodies in Great Britain do not require candidates for a qualifying degree or diploma to be examined in ophthalmology. It is true that questions on ophthalmic surgery are occasionally included in a paper or in the oral examination, but these can in no sense be considered as an adequate test of the candidate's knowledge of this subject.
>
> "In our opinion no licence to practise medicine should be granted without satisfactory evidence of an adequate knowledge of diseases of the eye. The supervision of the medical curriculum and qualifying examinations is in the hands of the General Medical Council. This body demands of medical students three months' attendance in an ophthalmic department, but representations of the inadequacy of this regulation have failed to produce any stronger insistence on more effective training in ophthalmology.
>
> "We recommend that the General Medical Council again be urged to insist that every student presenting himself for a qualifying examination in medicine shall be examined in ophthalmology."

This recommendation of the Departmental Committee, which was

composed of both laymen and medical men, is entirely in keeping with that submitted by the Council of British Ophthalmologists to your Council in 1919, in which it was suggested that: "no student shall be considered to have passed the qualifying examination unless he has shown a sound knowledge of practical ophthalmology in an examination conducted by ophthalmic surgeons."

The action which your Council took at that time was "That every student should be required to attend a course of practical instruction in Ophthalmology of not less than ten weeks' duration, and that no student should be admitted to the Final Examination unless he presents a certificate to the effect that he has attended such a course regularly, and that his work in connection therewith has reached a satisfactory standard."

The Council of British Ophthalmologists wishes to point out that this arrangement leaves it entirely to the ophthalmic surgeon in charge to determine what the evidence of satisfactory work in his department should be, an arrangement which is not considered sufficient with respect to any other of the essential subjects in a student's curriculum.

Further, the Council of British Ophthalmologists has ascertained that in the London Medical Schools the evidence of satisfactory work is receiving very different interpretations. In one school every student is now required to pass an examination before his certificate is signed, in others mere attendance in an ophthalmic department is recognised as sufficient.

This difference in the interpretation of the General Medical Council's requirements causes, not only a feeling of injustice amongst the students of the different schools, but is also eminently unsatisfactory in the want of uniformity in the standard of requisite knowledge which it sets up, and in placing the responsibility entirely in the hands of the teacher.

The experience of the Irish Universities and Colleges in which an examination in ophthalmology has been for many years recognised as an intrinsic part of the final examinations for their degrees and diplomas, shows that there is no great difficulty in conducting such an examination.

The Council of British Ophthalmologists desires to point out that the adoption of its recommendation would not entail any modification of the curriculum already required by the regulations of the General Medical Council, but only that an effective and uniform test be applied to the knowledge which a student should have acquired in the course of the curriculum.

The recommendation of the Departmental Committee on the "Causes and Prevention of Blindness," coinciding as it does with the previously expressed views of the Council of British Ophthalmologists, encourages the latter again to urge the General Medical

Council to insist by means of an examination in ophthalmology on a uniform standard of knowledge in this subject.

Yours very faithfully,

(Signed) J. B. LAWFORD,
President.

(Signed) M. S. MAYOU,
Hon. Secretary.

General Council of
Medical Education and Registration
of the United Kingdom.

44, HALLAM STREET,
PORTLAND PLACE,
LONDON, W.1

5th June, 1923.

The Honorary Secretary,
COUNCIL OF BRITISH OPHTHALMOLOGISTS,
59, Harley Street, W.1

DEAR SIR,—I have to inform you that your letter of the 28th March, drawing attention to the Report of the Departmental Committee on the Causes and Prevention of Blindness, was considered by the Examination Committee of the Council, and that the greater part of your communication was printed in full in the Report made by them thereon to the Council.

This Report was considered at the meeting of the Council held on the 1st June, and I was directed to inform you that it is too soon to judge of the effect of the Resolution recently adopted by the Council.

I might add that in regard to the paragraph in the Report of the Departmental Committee I was directed to inform the Ministry that on May 25th, 1922, the Council made certain recommendations to the Licensing Bodies for the improvement of the medical curriculum, one of which was that each student should receive instruction, *inter alia*, in the diseases of the eye, refraction, and the use of the ophthalmoscope. The Council thereby anticipated the wishes of the Departmental Committee as set forth in their Report, which was not published until the autumn of that year.

Yours faithfully,

(Signed) NORMAN C. KING,
Registrar.

ABSTRACTS

I.—OPHTHALMIC ABIOTROPHIES

(1) **Collins, E. Treacher (London).—Hereditary ocular degeneration.** (**Ophthalmic abiotrophies.**) International Congress of Ophthalmology, Washington, D.C., April, 1922.

(1) As Sir James Paget wrote many years ago (*Lectures on Surgical Pathology*, 4th edition, 1896, pp. 70 and 72): "It is natural to become feeble and infirm, to wither and shrivel, to have dry, dusky, wrinkled skins, and greasy, brittle bones, to have weak fatty hearts, blackened, inelastic lungs, and dusky thin stomachs, and to have every function of life discharged feebly, and as it were wearily; and then, with powers gradually decreasing to come to a time when all the functions of bodily life ceasing to be discharged, death, without pain or distress, ensues. The changes of natural degeneration in advanced life have a direct importance in all pathology, because they may guide us to the interpretation of many similar anomalies, which, when they occur in earlier life, we are apt to call diseases, but which are only premature degenerations, and are to be considered, therefore, as methods of atrophy—as defects, rather than as perversions, of the nutritive process—or as diseases only in consideration of the time occurrence." This is an anticipation of Sir William Gowers's theory of "Abiotrophy" or degeneration of tissues due to defective vitality. **Collins** classes as hereditary degenerations hereditary post-natal cataract, hereditary ocular palsies, retinitis pigmentosa, symmetric familial pigmentary macular degeneration, family amaurotic idiocy, Leber's optic atrophy, Doyne's family choroiditis, and lattice-like and nodular degeneration of the cornea. These widely different diseases are hereditary in the sense that they may be met with in several siblings of the same generation, and all, with the exception of symmetrical macular pigmentary degeneration and amaurotic family idiocy, in several different generations. The lesions are always bilateral. In none so far examined pathologically do the findings suggest inflammation, but are such as indicate degeneration in a certain definite group of cells. The occurrence of the degenerations in several successive generations of the same family renders it impossible to attribute them entirely to the absorption of any exogenous toxic substance or to the absence of any exogenous essential nutrient material, such as a vitamine. There seems to be no substance of one of the endocrine glands, upon which the structures involved in these diseases are dependent for their vitality; neither do we yet know of any toxic material developed endogenously either by bacteria or as the outcome of some faulty metabolic process, capable of poisoning the cells picked out-

by these diseases. Each of the diseases above-named is taken up successively by Collins and an attempt made from such pathological evidence as is available, to determine the structure in which the premature loss of vitality occurs, and the course and sequence of the clinical symptoms which follow.

S.S.

(2) **McHenry, J. H. (New York).—Clinical report of nine cases of amaurotic family idiocy.** *Arch. of Pediatrics*, March, 1917.

(2) The cases reported by **McHenry** were seen at the Polyclinic Hospital, New York, between September, 1915, and December, 1916. The observation of so many cases of a rare disease in a period of 16 months, leads the author to suggest that many examples of this malady are unreported, or are not diagnosed during the brief lifetime of the patients.

All nine cases occurred in the children of Hebrew parents; seven were female, one was male; in one (Case VII) the sex is given as female, but in the notes the child is spoken of indifferently as "he" or "she."

The clinical notes are those of typical examples of "Tay-Sachs" disease. In each case the Wassermann reaction was negative: increased intracranial pressure was present in the 8 cases in which lumbar puncture was performed.

Photographs of three of the children before and after the onset of symptoms are given, and a useful bibliography is appended.

J. B. LAWFORD.

II.—COLOUR VISION

(1) **Schanz, Dr. (Dresden).—Colour vision. (Das Sehen der Farben.)** *Zeitsch. f. Augenheilk.*, December, 1921.

(1) **Schanz** points out that up to the present the rods and cones have been regarded as the light sensitive elements of the retina, but this cannot be the case, for light can only produce an effect when it is absorbed. The rods and cones cannot absorb light; the absorption takes place in the pigment layer of the retina, and we are justified in assuming that electrons are expelled from this pigment by the absorbed light. The rods and cones act like antennae and collecting these electrons conduct them to the central organ. Light of different wave lengths corresponds to electrons of varying speed. This explains the perception of pure colour as seen in the spectrum. Nature affords practically no pure colours. Our world is seen as a colour mixture, and there are countless colours which our eye cannot differentiate from spectral colours. The ear can analyse a complex of tone, but the eye is powerless to analyse a

colour mixture. Colour mixture occurs when electrons of varying velocity are expelled simultaneously from the pigment epithelium and arrive at the central organ. There they can produce the same impression as pure colour which is caused by electrons of one velocity only. To explain this phenomenon we assume that electrons which travel together from the retina to the brain mutually influence each other as regards velocity; those of high velocity retard the slow and the slow accelerate the rapid. Mutual adjustment takes place and there will be a spot in the path where the speeds are equal. If this spot corresponds with the central organ then we shall get the sensation which would be caused by an electron speed which corresponds to that attained at the end of the journey by the combined electron complex. In each case the electrons reach the brain with the same velocity and elicit the same sensation. There is no other theory which explains colour perception in such a simple way. If the difference in wave length is too great the electron speed cannot obtain equilibrium at the central organ and no colour sensation is perceived. In this case we obtain the impression of white. The difference between the speeds of complementary colours falls into this category, and they are seen as white.

Schanz explains Purkinje's phenomenon by assuming that the electrons from red light have less energy than those from blue and in consequence when the intensity falls red light fails to stimulate and appears black.

He assumes that in congenital colour blindness the pigment epithelium is not absolutely black and that in consequence colours of certain wave lengths are not absorbed.

Acquired colour blindness is due to lesions in the tracts which inhibit the passage of electrons. Those with least energy, namely, the red are first affected.

Schanz' theory explains colour vision on the basis of physics and chemistry and does not, like those propounded by Helmholtz and Hering, fall back upon vitalism.

T. HARRISON BUTLER.

(2) **Schiötz, Ingolf (Christiania).—Red-green blindness as a hereditary peculiarity. (Rotgrünblindheit als Erbeigenschaft.)** *Klin. Monatsbl. f. Augenheilk.*, April-May, 1922.

Schiötz gives several pedigrees of colour blind families both of his own and of other observers with analytical notes. In all the cases of colour blind women that he was able to trace the father was found to be colour blind with one exception. In this case the colour blind woman was the only child and her mother had died when giving birth to her. The father was a Swede and the only member of his family living in Norway; he knew nothing of his wife's family. Schiötz thinks that the legitimacy of this daughter is very doubtful.

He concludes by stating that, as a result of his researches, he considers that there can be no doubt that congenital red-green blindness is always and without exception a recessive-sex-associated (*rezessiv-geschlectsgebundene*) hereditary peculiarity and that no exception to this rigid rule has yet been observed.

E.E.H.

III.—DISLOCATION OF LENS INTO ANTERIOR CHAMBER

Roche, C. (Marseilles).—Bilateral dislocation of lens into anterior chamber. (Luxation bilatérale du cristallin dans la chambre antérieure.) *Arch. d'Ophtal.*, Sept., 1921.

Roche records a case of this rare affection in a child of five years and six months. The child was badly developed, both mentally and physically; large head, high palatine arch and lamellar teeth. Five days before consulting Roche the parents had noticed a sudden appearance of a bright spot in both eyes. This was evidently the dislocated lens. Roche advised operation, but this was not done for six months. The right eye was then dealt with by fixing the lens with a needle and tearing it up with a cystotome. Six weeks later the soft lens matter which had become completely opaque was evacuated. Healing was uneventful, and the parents were advised to bring the patient up the following month in order to have the left eye operated on. They did not do so for three months as the patient had been seriously ill with bronchitis. Eight days before returning the child had complained of severe pain and headache. When Roche saw the child the left eye showed all the symptoms of a very acute glaucoma. The lens was still in the anterior chamber and was opaque. There was no perception of light. The lens was removed with the scoop with much vitreous loss. The eye became soft and shrunk. The right eye retained good vision with a +10 D. lens, but, owing to the child's poor mental development, no accurate test of the visual acuity could be made. The iris of this eye showed a zone of atrophy midway between the greater and lesser circles which, in places, enlarged to what resembled a definite cicatrix. Roche inclines to the view that there had been some intra-uterine uveal affection which had affected the zonule. In spite of the fact that there was no history of parental syphilis and that the Wassermann blood test in the patient was negative, he considers that the general condition of the child pointed to that disease as the source of the trouble. The great importance of operation as soon as the condition is recognized is obvious.

E. E. H.

IV.—LOCAL ANAESTHESIA

v. Liebermann, L.—Upon the technique of enucleation under local anaesthesia. (Zur Technik der orbitalen Lokalanasthesie bei der Enukleation.) *Zeitschr. f. Augenheilk.*, May, 1917.

The method adopted by **Liebermann,** in Budapest, is the following:—A 2% solution of novocain, with 0.8% of sodium chloride, and 0.4 % of potassium sulphate is made, and just before it is used 8 drops of a 1% solution of adrenalin is added to 10 c.cm. of the novocain solution. Three injections are given through the skin, not through the conjunctiva. Before the needle is inserted a small intracutaneous injection is given with a fine needle. The first insertion is made just under the outer canthus close to the margin of the orbit with a needle exactly 4 c.m. long; this is driven in to its full extent in the direction advocated by Löwenstein in order to reach the ciliary ganglion. The second situation is that recommended by Braun close to the superior orbital margin, and a finger's breadth above the inner canthus. For about 2 c.cm. a sagittal direction is chosen, then the canula is directed more downwards and to the temporal side till the full 4 c.m. is reached. The third injection follows at a spot where the inner third of the orbital margin joins the middle third. It is given through the skin of the lower lid, and the direction of the needle is upwards and towards the temple. 1.5 to 2 c.cm. of the solution is used each time or about 4.5 to 6 in all. The needle should be 0.6 to 0.7 mm. thick. After from about 20 to 30 minutes a painless enucleation can be performed. Liebermann states that it is a perfectly satisfactory method even with children of from 1½ to 2 years old. In the case of infants the needle must be pushed in for about 3 instead of 4 c.cm.

T. HARRISON BUTLER.

V.—SECRETION OF THE AQUEOUS HUMOUR

Hagen, Sigurd (Christiania)—The aqueous humour and its secretion in the human eye. (Om kammervandet og dets ansondring i det menneskelige oie.) *Norsk Mag. f. Laegevidensk*, 1921.

It has long been known that in the animal eye there is found a profuse secretion of fluid from the ciliary body, when the latter is influenced by irritants which cause hyperaemia of the ciliary vessels. The secreted fluid differs from the normal aqueous humour in that it is highly charged with albumen and fibrin. There are two special irritants which are generally employed and

are very effective: sub-conjunctival injections of hypertonic salt solution and evacuation of aqueous humour. Wessely showed, that after sub-conjunctival injection of salt solution in the eye of the rabbit, as a consequence of the activity of the ciliary body, there occurs an enlargement of the intraocular content, distinguished by an increase in intraocular pressure. By means of his manometer Wessely discovered that a few minutes after the injection the intraocular pressure was increased to a considerable degree; yet the increase was of quite short duration, and went again down below normal during the first hour after the injection.

Wessely believed that the effect on the human eye was essentially the same as on that of a rabbit.

The present author made the same experiment on the human eye and found that it reacts in quite a different way from the rabbit's eye. After sub-conjunctival injection of a 5 or 10 per cent. strength salt solution he carried out a series of measurements of the intraocular pressure by means of Schiötz's tonometer. As in the rabbit's eye, there was found an increase in the tension, although very slow, so that the maximum was not reached until after one hour. However, it was then sustained for several hours. The author supposes that the increase in the intraocular pressure in the human eye also is caused by an increased intraocular content as the consequence of a secretion in the interior of the eyeball; but this secretion is less profuse, and proceeds much more slowly, but on the other hand is much more protracted.

The most effective irritant for the rabbit's eye is evacuation of aqueous humour. The anterior chamber fills after a few minutes; but the newly formed aqueous humour differs from the normal in that it contains a considerable quantity of albumen and fibrin and therefore coagulates spontaneously.

It has been definitely proved that the newly formed aqueous humour in the rabbit's eye is secreted from the ciliary body. By examining the intraocular pressure in the rabbit's eye after evacuation of aqueous humour, there will be found a curve, which quite corresponds to that after sub-conjunctival injection of salt solution, which proves that the immediate new formation of aqueous humour in the rabbit's eye proceeds from the blood-vessels.

It is generally accepted, as will appear from all the important text-books on Ophthalmology, that the new formation of aqueous humour in the human eye proceeds in the same way as in the animal eye. The author believes he has shown by his experiments that this is not the case. The newly formed aqueous humour in the human eye does not contain more albumen than the normal aqueous nor more fibrin and does not coagulate spontaneously.

By measuring the intraocular pressure in a physiologically *normal human* eye which had to be enucleated because of a small

intraocular tumor, it was shown that though the anterior chamber had filled itself after four minutes, the intraocular pressure was not increased to the normal level before 1½ hours after the evacuation of the chamber. So long is the time taken for the ciliary body in the human eye to replace the evacuated aqueous humour.

From these experiments it may be concluded that in the human eye the immediate re-formation of the aqueous humour takes place from the vitreous body by filtration through the Zonula of Zinn, but the secretion from the blood-vessels (ciliary body) proceeds very slowly in the same way after evacuation of aqueous humour, as after sub-conjunctival injection of salt solution. S. S.

VI.—AFFECTIONS OF THE OPTIC NERVE

(1) **Rönne (Copenhagen).—On acute retrobulbar neuritis localised in the chiasma. Clinical and pathological anatomical investigations. (Ueber akute Retrobulbär neuritis, im Chiasma lokalisiert.) (Klinische und pathologische anatomische Untersuchungen.)** *Klin. Monatsbl. f. Augenheilk.*, p. 68, Juli-Aug., 1915.

(1) The chief features of this condition are described by **Rönne** as follows:—

1. The onset, subjective symptoms and course are practically identical with those of the more severe forms of retrobulbar neuritis.

2. The changes in the fields of vision are most frequently characterized by hemiopic (often bitemporal) defects with central scotoma.

3. The field defect has often a peculiar wandering character. This is very typical and is probably not present in any other condition. In some cases it is absent and is replaced by a significant but irregular change in the form of the visual field as may occur in gummatous basal meningitis.

4. Ophthalmoscopically papilloedema or optic neuritis is often present together with the other clinical signs of retrobulbar neuritis.

Eleven cases are described, five of which are from the literature, and numerous charts of the fields are given showing the characteristic changes. In two cases a microscopical examination of the optic nerves, chiasma and tracts was made. Inflammatory foci were found resembling those present in disseminated sclerosis. These conditions are illustrated by five excellent plates, one of which is coloured.

Rönne believes that these cases may be regarded as belonging to the category of "acute optic neuritis with myelitis," although spinal symptoms are by no means always present.

With regard to the localization of the pathological process in the chiasma, he expresses himself as follows:—"1. The affection of the optic nerves, which is often associated with myelitis and acute multiple sclerosis is a retrobulbar neuritis, without regard to the frequently accompanying optic neuritis or papilloedema. The ophthalmoscopically visible papilloedema is secondary to the process in the more proximal parts of the visual path. The affection is localized in the optic nerves, and especially in the chiasma; the latter position often strongly influences the field of vision and the course of the disease. 2. A similar retrobulbar neuritis with predominating localization in the chiasma may occur without accompanying spinal symptoms."

One of the cases (No. 6) had an aneurysm of the anterior cerebral artery which was interfering with the chiasma, and at the same time a glioma cerebri in the left frontal lobe. Rönne holds that this tumour rather than the aneurysm was the cause of the retrobulbar neuritis, and that the papilloedema which was present was secondary to the inflammatory condition in the nerve, though the connection between the retrobulbar neuritis and the tumour could not be explained. While it does not carry us very far, this paper is a step on the way towards the solution of the causation of retrobulbar neuritis. It is of interest to note that visual symptoms of the type described are often produced by hypophyseal tumours and other conditions.

H. M. TRAQUAIR.

(2) **Hegner (Jena).—On rare forms of hemianopic disturbance of the visual field following bullet wounds. (Ueber seltene Formen von hemianopischen Gesichtsfeldstörungen nach Schussverletzungen.)** *Klin. Monatsbl. f. Augenheilk.*, p. 642, November-December, 1915.

(2) Hegner gives details of three cases of tangential occipital bullet wounds. In all three the bone was slightly splintered, but the brain tissue itself was not traversed. The first case presented a small paracentral scotoma occupying the apex of each left lower quadrant, the second a right-sided hemiopic scotoma involving the apices of both upper and lower right quadrants, and the third showed a defect in the lower inner part of each left lower quadrant extending to within ten degrees of the fixation point. Hegner concludes that the macular fibres are distributed to a very small circumscribed area at the posterior end of the occipital lobe, and considers that these cases provide evidence against the bilateral cortical representation of the macular area.

H. M. TRAQUAIR.

(3) **Knapp, Arnold (New York).—Optic neuritis after influenza, with changes in the spinal fluid.** *Arch. of Ophthal.*, Vol. XLV, No. 3, May, 1916.

(3) **Knapp** records a case of bilateral optic neuritis following influenza. A star-shaped figure was seen around the macula, resembling that found in albuminuric retinitis, but much more delicate and more silvery; it rather resembled the star sometimes found in optic neuritis associated with brain disease. There was a central colour scotoma. Improvement took place slowly, uninfluenced by treatment, and the ophthalmoscopic changes disappeared; but the vision fell appreciably (to 20/30) owing to macular lesions. The optic nerves may have been affected through the blood, through the cerebro-spinal fluid or through the nasal accessory cavities. The examination of the blood was negative in this case, whilst the changes in the cerebro-spinal fluid were those of a mild infection, the expression of a toxic reaction on the part of the meninges to the influenza poison. It was possible to exclude infection from the nose. Knapp believes that the optic neuritis was caused by a haematogenous infection, which at the same time produced a slight toxic reaction on the part of the cerebro-spinal fluid.

R. H. ELLIOT.

(4) **Behr, Carl (Kiel).—Contribution to the differential diagnosis of oedematous papilla and inflamed papilla in their primary stages of development and the theory of oedematous papilla. (Zur Differential diagnose der Stauungspapille und der Entzündungspapille in ihren ersten Entwicklungs-Stadien und zur Theorie der Stauungspapille.)** *Klin. Monatsbl. f. Augenheilk.*, Vol. LVII, November-December, 1916.

(4) Seeing that it is by no means seldom that the ophthalmoscopic finding decides the diagnosis as to whether the disease one has to deal with is general or cerebral and indicates the therapy, at the outset **Carl Behr** emphasizes the importance of differentiating between oedematous papilla and inflamed papilla as early as possible in the course of development. He deprecates the indiscriminate use of "optic neuritis," "papillitis," and "choked disc" as though they were synonymous, and suggests that the employment of the terms "oedematous papilla (Stauungspapille)" and "inflamed papilla (Entzündungspapille)" would obviate confusion as to whether the ocular condition is due to infection or mechanical derangement of the lymph circulation in the eye.

He contends that the use of the two modern methods of examination—dark-adaptation and the stereoscopic view of the fundus by means of Gullstrand's reflexless ophthalmoscope—enables one to arrive at an early and trustworthy differential diagnosis. In a

former communication he has shown that, as a rule, in inflamed papilla, even while the other functions are not appreciably deranged, there is a marked diminution of dark adaptation, whereas at the onset of oedematous papilla the dark adaptation remains normal.

Long before the ordinary ophthalmoscope reveals any change, a stereoscopic view with the Gullstrand apparatus brings into relief a glassy swelling involving some part of the edge of the disc, generally above or below or nasally, but never the whole disc simultaneously. Then the swelling spreads to other parts of the edge as in a hilly landscape. The retinal vessels ride over the swelling and are not enveloped by it. The lamina cribrosa remains visible, and as a rule even at a late stage the physiological cup does not become completely obliterated. As the swelling increases the unevenness of the disc diminishes, but the temporal side of the disc remains generally less prominent, even when the swelling is far advanced. Even when the prominence has attained its maximum, the transparency of the nerve tissue is maintained and thus the border of the optic foramen remains visible, although it is masked to the usual direct method of ophthalmoscopy. It is only at the stage when the presence of oedematous papilla is quite obvious even to the ordinary method of examination that the nerve-fibre tissue generally begins to get cloudy.

The inflamed papilla reveals itself quite otherwise to Gullstrand's apparatus. It never begins with a glassy transparent swelling. The cloudiness of the papilla begins very early and affects the structure not in parts but as a whole. The border of the optic foramen and the lamina cribrosa become veiled and invisible at a time when the swelling of the disc is at its minimum. Instead of the retinal vessels as they leave the lamina cribrosa riding over the swelling, they become overlaid and obscured by cloudy nerve fibres and exudate.

To summarize the differences at their commencement between Oedematous papilla and Inflamed papilla:—

Oedematous papilla	Inflamed papilla
No disturbance of acuity and field of vision. Normal dark-adaption.	In most cases, diminution of vision and scotomata in the field. As a rule marked disturbance of dark-adaptation.
Nerve fibre tissue long transparent, optic ring long visible, lamina cribrosa long visible, vascular funnel long maintained.	Clouded. Blurred or invisible. Veiled or invisible. Obliterated.
Vessels ride on the swelling.	All in parts overlaid by clouded tissue of papilla.
Perivascular space invisible.	Often recognizable as white sheathings of the vessels.

Carl Behr's theory of papilloedema is that it is a genuine oedema of the nerve fibres themselves, that it is altogether indepen-

dent of the blood vascular system, and that it is caused by centripetal obstruction to the flow of lymph. He discusses the other theories and shows how his theory explains the phenomenon better.

D. V. GIRI.

(5) **Sharpe, William (New York City).—The pressure signs of certain intracranial conditions, observable in the fundus of the eye.** *Arch. of Ophthal.*, Vol. XLVI, No. 4, p. 320, 1917.

(5) **Sharpe** states that the effect of an increase of intracranial pressure upon the fundus of the eye can be easily demonstrated throughout its various stages by the experimental production of an internal hydrocephalus in dogs, and proceeds to describe his own experiments on the subject in some detail. He next insists on the necessity of keeping those terms which imply an inflammatory process, e.g., papillitis, apart from those which merely connote the effects of pressure, e.g., papilloedema and "choked disc." Pressure can and does cause congestion and oedema, but it does not cause inflammation, unless infection is present. Retinal haemorrhages are rare in cases of choked disc, due to even extreme intracranial pressure, when occurring alone, whereas they are very common in inflammatory conditions. Under pressure conditions Sharpe recognises the following stages: (*a*) blurring of the disc edges; (*b*) oedema hiding the details of the disc themselves; (*c*) measurable swelling of the disc (papilloedema); and (*d*) choked disc, where the papilloedema is greater than two or three dioptres. The signs of increased intracranial pressure as seen in the fundus must be checked by measurements of the pressure of the cerebro-spinal fluid, made by means of lumbar puncture with the use of a spinal mercurial manometer. If the pressure of the cerebro-spinal fluid is found to be increased, a more accurate diagnosis of the intracranial condition is reached; it is thus possible to exclude cases in which the optic discs are "normally blurred."

Sharpe next takes up certain intracranial conditions and discusses each in turn along the lines above laid down.

1. *Intracranial tumour.*—It is rare in cases of brain tumour for a choked disc to result unless the growth has either attained a very large size, or has blocked the ventricles; the prompt diagnosis of these cases by the recognition of the early papilloedema will make for the saving both of life and vision.

2. *Brain abscess.*—Inasmuch as the purulent detritus merely replaces the brain tissue, we do not meet with signs of intracranial pressure in these cases, unless the ventricles are blocked, or meningitis supervenes; it is rare for temporo-sphenoidal abscess to produce fundus changes even though the abscess may be very large.

3. *Intracranial haemorrhage and oedema following fractures of the skull* rarely produce choking of the discs, since the patient dies before this sign supervenes. It is less important to know the site and extent of the fracture than to ascertain the presence of increased pressure, since an early relief of this pressure by means of a decompression operation offers great advantages if effected *before* the patient reaches the dangerous stage of extreme medullary compression.

4. *Cerebral spastic paralysis* is due to three causes: (*a*) a lack of cerebral development; (*b*) a meningitis or meningo-encephalitis; and (*c*) an intracranial haemorrhage. In the first class there is no rise of intracranial pressure, nor is it present in cases of the second class which survive the inflammatory symptoms; whereas in patients with intracranial haemorrhage the increase of pressure is highly marked in the very young, and sufficient for recognition even in those who are older. The important point is that early diagnosis enables the surgeon to intervene for the relief of intracranial pressure.

5. *Hydrocephalus.*—The internal type of this condition, which is due to a blockage of the cerebro-spinal fluid in the ventricles, and which is accompanied by dilatation of the ventricles and high intracranial pressure, can produce a marked degree of choked disc, and its subsequent secondary optic atrophy. The recognition of the condition enables the surgeon to save the patient's sight by means of a suitable drainage operation.

Sharpe shortly discusses some other conditions in which an ophthalmoscopic examination is of great importance in enabling a surgeon to recognize an increase in the intracranial pressure, including various forms of meningitis, and the different types of apoplexy.

The paper is well worthy of careful study, and the more so since it is pleasantly and interestingly written.

R. H. ELLIOT.

(6) **Früchte, Dr. W. (Barmen).—On central scotoma in accessory sinus disease and following a blow on the skull. (van der Hoeve's symptom.) (Zur Kentniss des zentralen Skotoms nach Nebenhöllen-erkrankung, und nach Sturt auf den Schädel. (van der Hoevesches Symptom).** *Klin. Monatsbl. f. Augenheilk.*, February-March, 1917.

(6) Früchte sums up previous literature on this subject and gives notes of two cases from Axenfeld's private clinic. The first case was a woman of 23 years who came complaining of a mist before the right eye. She had had an operation ten days before for ethmoidal suppuration in which an opening had been made into

the ethmoidal cells and also into the right sphenoidal sinus. The vision in both eyes was normal. Measurement of the field showed a blind spot thrice the normal size. This varied in size during the next few days, and eventually a complete Killian operation including the frontal sinus was performed. This was unfortunately followed by a paralysis of the superior oblique. The blind spot was reduced to normal and remained so. There was never any ophthalmoscopic abnormality. The second case was a man of 24 who had suffered from an injury to the head which was followed by loss of consciousness of short duration five weeks before being seen by Axenfeld. Immediately after the accident he noticed the sight was affected, but that, while the left eye speedily recovered, the right eye did not do so, and saw a black spot in front of it. The vision of the right was less than 5/60; that of the left 5/5. The field showed an absolute central scotoma extending out to about 15 degrees. There was no ophthalmoscopic change. Früchte believes that the most probable cause of the scotoma in this case was a haemorrhage in the central part of the nerve behind the globe. He thinks that pressure on the nerve may also play the most important part in the production of a central scotoma in cases of accessory sinus disease.

E. E. H.

(7) **Lhermitte, J.—Encephalitis lethargica. Pathological anatomy and physiology; experimental pathology, microbiology. (L'Encéphalite léthargique. Anatomie et physiologie pathologiques; pathologie experimentale, microbiologie.)** *Arch. d'Ophtal.*, Jan., 1921.

(7) **Lhermitte** has published a very useful account of the pathology of encephalitis. The article is concerned chiefly with the work of other authors, and while containing nothing very new or original, will be found of considerable use to those interested in the subject. He first deals with the macroscopic and microscopic anatomy of the disease, and from this proceeds to what he calls the physiology, i.e., the correlation of the clinical symptoms with the lesions found. He concludes with an account of the experimental work done on the disease. He considers that the evidence as to the disease being caused by a virus that can be cultivated and not by a toxin, as earlier observers (Wernicke) had believed, is conclusive. Wiesner isolated a diplostreptococcus and injected a pure culture into an ape. The animal presented some symptoms of the disease. It was killed on the 12th day and showed characteristic lesions. Harvier and Levaditi, experimenting with rabbits, found that the germ passed the finest filters, and could not agree with Wiesner, but considered that the virus is analogous to the one causing acute poliomyelitis. Lhermitte is unable to offer any opinion on the matter.

E. E. H.

BOOK NOTICES

The Principles and Practice of Perimetry. Second Edition, thoroughly revised. By LUTHER C. PETER. Philadelphia and New York: Lea & Febriger. 281 pp., 161 engravings and 5 coloured plates. 1923.

While the general plan of the book remains unchanged, recent work in connection with perimetry and allied subjects is reflected in the numerous alterations and additions which have been made to the second edition of Dr. Peter's well known treatise.

In the section on anatomy, Meyer's description of the temporal loop of the optic radiations is adopted, while other important points such as the level at which fibres from corresponding retinal points come together, and the single or double cortical representation of the macula are, perhaps wisely, left without a definite expression of opinion. A feature of the chapter on the technique of field-taking is the strong advocacy of standardization of illumination and the use of proper pre-exposure when colour tests are used. The Ferree-Rand perimeter, which enables these precautions to be carried out, is recommended as being greatly superior to other models and the ordinary type of mechanical perimeter is referred to only to be condemned.

The advantages of the larger projection of defects obtained by using the Bjerrum screen at two metres is recognized, though the employment of test objects subtending angles as large as five to thirty minutes is advised as likely to avoid errors while losing nothing in efficiency or accuracy. In our experience, however, we have frequently found defects with an angle of two minutes which were not demonstrable with five minutes, and as far as we are aware no specific instance of error arising from the use of smaller angles has ever been brought forwards.

Scotomata are divided into "indistinct," "relative," and "absolute." In the first the test object is dimly seen, in the relative type "form" is seen but colours are not recognized. The advantage of this distinction, which depends almost entirely on the test objects used, is not apparent.

In the section on the special pathology of fields we must confess to some difficulty in following the description given of the field changes in papilloedema and papillitis, but we are glad to note the author's reserved attitude towards the question of the relationship of field changes in pregnancy to pressure from enlargement of the pituitary body and his omission of reference to a similar hypothetical causation for Leber's disease, the site of which is certainly sub-chiasmal as indicated.

Recent work has shown how much remains to be learned with

regard to the anatomical, physiological and pathological factors which underlie perimetric examination and interpretation, and in bringing a book of this kind up to date the introduction of controversial matter can hardly be avoided. The statement that the expression object/distance as a record of the visual angle employed is incorrect and misleading and has no value as a fraction is, however, surely somewhat hasty. It has apparently not been realized that the constant $\frac{180^\circ}{\pi}$ is understood, the full equation being $A = \frac{O}{D} \times \frac{180^\circ}{\pi}$ In regard to the homonymous hemianopia of temporal lobe lesions the defect is usually, but *not always* most advanced on the homolateral side, an observation which weakens the author's explanation of the incongruity.

The author's defence of colour testing is welcome and evidently necessary in relation to a tendency developing in America to replace colour testing or "qualitative" perimetry by the use of graduated white objects or "quantitative" perimetry. European workers are unfamiliar with the use of the term "quantitative" to exclude colour testing, and Ronne, who introduced the expression, pointed out clearly that white tests did not form a substitute for colour, and that coloured objects should also be quantitatively employed.

Some useful illustrations have been added, especially the excellent colour plate of opaque nerve fibres and the bibliography, which has been enlarged, forms as before a valuable feature. A few misprints have escaped notice. While the future will show what reconsideration may be advisable, at the present time no ophthalmic surgeon can afford—and no neurologist ought—to be without a book on perimetry, and this new edition will receive a widespread and hearty welcome.

G. B. Morgagni nella storia dell'Oculistica. By GUISEPPE OVIO. Milano: Dottor Francesco Vallardi. 1923. pp. 8 and 278. Six plates and portrait of Morgagni.

A careful study of the work of him who was called "facile princeps Anatomicorum" has shown, says Ovio, that his influence in ophthalmology has been larger than is generally supposed, and, therefore, he has felt it his duty to place it before his colleagues in the full light of day. Morgagni's work seems to him a centre towards which all preceding knowledge tended, and from which succeeding studies have led gradually to our present position.

In this little book, Ovio tries to establish this point of view; his first section deals with the position of ophthalmic science up to the time of Morgagni; the second section contains, arranged in a schematic manner, the various observations and studies on

points of ophthalmology which are found in Morgagni's various works.

In the third section he deals critically with each point, and shows how our modern knowledge is connected with that of Morgagni.

Morgagni's investigations covered eleven parts of the field; not only anatomy and physiology, human and comparative, but also pathology interested him, and he may be called the founder of pathological anatomy. He referred all questions of anatomy to the best authority, the examination of the body itself, and thus he was able to correct many erroneous ideas which were current.

The marshalling of the facts in the form that Ovio has chosen, will carry conviction concerning his thesis, to every impartial reader. But the form is somewhat dry, and this will limit the number of those who will become familiar with the book.

HAROLD GRIMSDALE.

Optotypes consisting of Test-letters and Pictographs for measuring the Acuteness of Vision. By DR. JOHN GREEN AND DR. A. E. EWING. London: Henry Kimpton. Thirty-five engraved plates and an explanatory pamphlet of 24 pages. Price 25s. 1923.

The foreword and first two sections of the pamphlet were written by the late Dr. Green previous to his death in 1913. Two hundred copies of the tests were published at the same time but without the book. These copies were given to personal friends. Dr. Ewing has now completed the book and reprinted the tests, the letters from the original plates of 1886 and the pictographs from the plates of 1902. The pamphlet explains the mathematical basis on which the size of the letters and pictographs as well as the distance at which they should be read have been calculated. The test cards are well reproduced, and should be found of considerable use in the accurate noting of subjective tests. The pamphlet is disfigured by some careless misprints, one of which occurs even on the cover.

CORRESPONDENCE

SEPSIS IN RELATION TO GLAUCOMA

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY

SIR,—Perusal of the literature of glaucoma affords so many facts suggesting a close association between this disease and sepsis that a more thorough examination of the question is indicated.

Recently the writer examined five cases of glaucoma and in every instance, culture from the conjunctiva gave a heavy growth of staphylococcus albus. Pieces of uvea from four cases were incubated, and two of them, from cases of relatively recent glaucoma gave a growth of staphylococcus albus, while two from cases of chronic glaucoma showed no growth.

There are reasons for thinking that the growths obtained from the uvea were not due to contaminations and that the germ was actually present in the tissues.

In taking cultures from the conjunctiva the spatula was carried well below the surface of the agar, and in every instance there was heavy growth extending from the surface of the medium to the end of the track made by the stab.

In incubating the uvea, the tissue was carried well below the surface of the medium with the spatula, and in no case was there infection of the surface or of the track left by the stab, so that evidence of contamination in the uveal cultures is not strong.

In two recent cases there was a fairly vigorous growth from the tissues outwards, and in two chronic cases there was no growth.

That the chronic cases should show no growth does not in any way contra-indicate a septic origin of the disease. During a septic attack the germ becomes less virulent, and it is not unusual, for instance, in chronic pus tubes, to find that the infective agent cannot be demonstrated, but there is no question as to the infective origin of the disease.

In chronic glaucoma the vascular degeneration is such that we should expect progressive atrophy in the tissues, even if the germ were no longer viable and there were no question of toxic absorption. I was much struck recently when eviscerating an eyeball in a case of fairly recent glaucoma by the fact that the haemorrhage seemed to be purely arterial, whereas in a case done a short time previously for severe trauma the haemorrhage appeared to be purely venous.

The cultures from the uvea, in the cases which gave positive results, were so different in character and appearances from the conjunctival cultures as to give the impression that they were due to a different germ, until the microscope proved that, morphologically at least, they were the same. As the staphylococcus to become viable in the uvea must, to some extent at least, take on an anaerobic habit of life, its characteristics must be greatly modified and cultures from it would also show great differences from those of the aerobic germ.

As there is so marked a difference between the conjunctival and the uveal cultures in these cases the matter demands investigation, and I am drawing attention to it because this method of attacking the problem has not been generally used, and because it is to be hoped

that others will take up the investigation as its solution seems to depend upon a multiplicity of observation.

If we find in our cases of recent glaucoma, cultures of staphylococci from the uvea, which differ consistently from those obtained from the conjunctiva, we cannot, *a priori*, exclude the staphylococcus as a potent factor in the disease.

Yours truly,

MONTREAL. RICHARD KERRY.

THE LARGE LENS OF THE GULLSTRAND SLIT-LAMP

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY

SIR,—Those familiar with the slit-lamp will be aware that only an elongated vertically disposed central portion of the lens referred to above is made use of, the portions of the lens on either side of this being superfluous. The area used is defined by the aperture in the diaphragm, which elsewhere covers the superfluous portions of the lens. The lens is of large diameter (50 mm.) in order that it may receive rays, emerging from the slit-diaphragm, covering a relatively wide vertical angle. The lens being accurately corrected, and being of such large diameter, produces a good intensity of focal illumination. Even so, the intensity with the ordinary Nernst-filament slit-lamp leaves no spare power to waste; for high power work, the intensity with this lamp sets many limitations.

The large cross-diameter of the lens is undesirable, as most owners of the apparatus must have experienced, because it prevents the illuminator being brought to a sufficiently acute angle with the objectives of the microscope to enable the observer thus to view the deeper parts of the vitreous, only the vitreous just behind the lens and not that which is deeper being directly accessible to view. The present method of looking deeper into the vitreous is to make an elaborate readjustment of the instrument and employ Koeppe's reflecting mirror to procure the deeper view. This mirror is a very necessary accessory for certain procedures, and familiarity with its use is called for; but when time is limited it is a disadvantage to be compelled to make a gross readjustment of the apparatus every time that a rather deeper glance into the vitreous is desired.

There are, moreover, other instances, in routine observation of more anterior parts of the eye, in which facility for a simple change to an acute angle between the axes of illumination and observation is desirable. This is rendered feasible by Dr. Vogt's " small

lens," the diameter of which is much smaller than that of the large Gullstrand lens; but the objection I have experienced in the use of this small lens is that the intensity of the focal illumination is diminished in proportion with the reduction in the diameter of the lens, and even with the Gullstrand lens there is, as I have suggested above, already but little light to spare.

I have, therefore, had a lens made which in shape and dimensions resembles the large Gullstrand lens with its superfluous lateral portions ground away; this lens serves the purposes served by the Gullstrand lens, and in addition permits of adjustment between the axis of observation and illumination to a much more acute angle. The small Vogt lens is not highly corrected for aberration because such correction is unnecessary for the smaller vertical angle of the fewer incident rays which it collects; but efficient correction is required in the larger Gullstrand lens, and it is this that makes it expensive.

Readers may care to know that Messrs. C. Davis Keeler have kindly offered to grind down the Gullstrand lens to the shape I have indicated at no more than what they suggest is but a very small risk of damage to the lens in the process of grinding. One precaution I would add—the transverse width of the product should somewhat exceed the measurement set by the present diaphragm of the Gullstrand lens, to avoid the possibility of any rays from the lateral portion of the transmitted beam impinging at the grazing angle on the flattened sides, and so being internally reflected at the critical angle, with disturbing results; and for that matter, the sides need not be made quite flat. The lens is mounted in a holder of suitable width.

Yours truly,

BASIL GRAVES.

LONDON,
August 14, 1923.

NOTES

Deaths

WE regret to announce the death of KARL v. HESS, of Munich. Details of the life work of this distinguished man will be published in a later number.

Dr. M. R. LÖWEGREN, who founded the first eye clinic in Sweden, has died at the age of 87 years.

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Appointment

Mr. C. L. GIMBLETT has been appointed ophthalmic surgeon to the Royal Northern Hospital, London.

Council of British Ophthalmologists

THE officers of the Council of British Ophthalmologists for 1923-1924 were elected at a meeting on July 12. The names are as follows:—President, Mr. E. T. Collins; Vice-Presidents, Sir G. A. Berry, Mr. J. H. Fisher; Hon. Treasurer, Mr. J. H. Fisher; Hon Secretary, Mr. M. S. Mayou; Executive Committee, The President, Vice-presidents, Secretary (*ex-officiis*), Messrs. J. B. Lawford, W. H. MacMullen, and Sir John H. Parsons.

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The Optician Question

AT the annual representative meeting of the British Medical Association, held this year at Portsmouth, it was moved by Mr. Turner: "That any State recognition of sight-testing by persons not possessed of medical qualification would not be in the interests of the community, and ought to be opposed in the strongest possible manner." Mr. Bishop Harman proposed the addition of the words: "And that the Council be instructed to take action on this decision." The amendment was carried and the motion as amended was adopted.

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Brooklyn Ophthalmological Society

THE first Annual Dinner Meeting of the Brooklyn Ophthalmological Society was held at the University Club, 109, Lafayette Avenue, Brooklyn, N.Y., May 17, 1923. The following officers were unanimously re-elected for the coming year:—President, Dr. Joseph E. Golding; Vice-President, Dr. Ralph I. Lloyd; Secretary-Treasurer, Dr. Willis M. Gardner; Members-elect of the Executive Committee, Dr. Henry M. Smith and Dr. John H. Ohly.

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British Medical Association

AT the British Medical Association at Portsmouth the Section of Ophthalmology held meetings on July 26 and 27. At the former there was a discussion on the Clinical Significance of Scotometry. It was opened by an excellent paper by Dr. A. H. H. Sinclair of Edinburgh, and was continued by Dr. Gordon Holmes, Messrs. Hepburn, Neame, Harman, Pickard, and others The discussion on the second day was on Ophthalmology in its relation to the Navy, Army, and Air Force. The various aspects were set forth by Air-Commodore David Munro and Wing-Commander Cecil Clements for the Air Force; by Major-General Sir William Macpherson and Major J. H. Gurley for the Army; and by Surgeon-Commander Breton for the Navy, Major Spaeth (U.S.A.), Messrs. M. W. B. Oliver, Bishop Harman, Maddox, and others took part. At the conclusion a resolution was passed unanimously urging the Government to carry out research in these ocular problems.